Bioscience Discovery, 6(1): 49-53, Jan - 2015
© RUT Printer and Publisher (http://jbsd.in)
ISSN: 2229-3469 (Print); ISSN: 2231-024X (Online)
Received: 18-11-2014, Revised: 09-12-2014, Accepted: 21-12-2014

Full Length Article

Pharmacognostic Study of *Adhatoda vasica* Nees

Kanthale P R and Panchal V H

Department of Botany, Nutan Mahavidyalaya, Selu Dist. Parbhani- 431503
knthle@rediffmail.com

ABSTRACT

The Pharmacognostic study of Adulsa leaves was carried out to detect the adulteration. Studied characters are stomata, trichomes and anatomical features etc. The plant was analyzed for its preliminary screening of phytochemicals. The results reveal that the plant shows presence of bioactive constituents comprising alkaloids, reducing sugar, anthraquinones, saponins, flavanods and tannins. In the present study medicinal uses, Phytochemical analysis and Pharmacognosy of plant have been revived.

Key Words: *Adhatoda vasica* Nees, pharmacognostic studies, Phytochemicals, Adulteration and powder analysis.

INTRODUCTION

Adhatoda vasica is used as medicine in the treatment of various diseases because it has ability of the formation of secondary metabolites like tannins, alkaloids, saponins, flvanoids, reducing sugars and anthraquinones substances which are in turn used to restore health and heal many diseases. Medicinal plants constitute important components of flora and are widely distributed in different regions of India (Kaushik, 2009). The *Adhatoda vasica* Nees is large shrub, 1-2 m tall.

Leaves are used to treat cough, Asthma, fever, tuberculosis, piles, jaundice, bleeding gum, as an expectorant and as a bronchodilator (Taydae and Patil, 2005; Mishra and Broker, 2009; Singh *et al.,* 2010; Mahajan, 2007; Dey *et al*. 2009; Venkataswamy *et al*., 2010; Muhbubur Rahman *et al*. 2013 and Naik, 1998). Decoction of plant is given in cold and in rheumatism. Extract of root, bark, leaves and flower is used for bronchial, asthmatic and Pulmonary affections (Ramaya and Jayakumarara 2009). *Adathoda vasica* is also been used to speed delivery during childbirth (Sampath Kumar, 2010).

MATERIALS AND METHODS

The leaves of *Adhatoda vasica* Nees collected from Medicinal plants Garden of Nutan Mahavidyalaya, Sailu district Parbhani. The collected plant material was taxonomically identified by using renowned floras (Naik, 1979, Naik *et al.,* 1998; Chetty *et al*., 2008 and Yadav and Sirdesai, 2002). The voucher specimen of plant was preserved in the Department of Botany, Nutan Mahavidyalaya Sailu. Leaves were shade dried and powdered. The powder was successively extracted with different solvent. The fresh leaves and stem were used for the study of macroscopic and microscopic characters.

Preliminary phytochemical Screening

Phytochemical screening of leaves extracts of *Adhatoda vasica* Nees in different solvents were undertaken by using standard methods for the analysis of secondary phytoconstituents like alkaloids, reducing sugar, anthraquinones, saponins, flavanods, tannins, glycosides, flavonoids, tannins, terpenoids and cardiac glycosides (Harborne, 1984).

Prepearation of extract

Leaves powder was subjected to Soxhlet extraction with petroleum ether (60-80^{0}c), Methanol (64.5-65.5^{0}c) and water for 3-4 h in the order of increasing polarity of solvents (Daniel, 1991).

The extracted solvent is evaporated to make the final volume one fourth of its original volume. Yield of extracts were 6.3, 12.7 and 14.56 % respectively. The extracts were stored at 4^0c in airtight bottles for further study.

Macroscopic study

Morphological studies were done using simple microscope. The shape, apex, base, margin, taste and odour of leaves powder were observed.

Microscopic studies:

The free hand transverse section of leaves and stem were taken and stained by using double stained differential staining technique and the section were mounted in DPX (Johanson, 1940). The cellular and anatomical illustration was prepared by using camera lucida and some photographs were taken with the help of digital camera.

The leaf was peeled off for the study of stomata and the trichomes of upper and lower epidermis. For the study of vessels the stem was macerated by using Jeffery's fluid and stained with aqueous 1% saffranin and mounted in glycerine and made semipermentant by ringing with DPX mountant.

The leaves powder was treated with phloroglucinol and HCl for the detection of lignin. Glycerin and iodine solutions were used to determine calcium oxalate crystal and starch grains respectively. As a part of quantitative microscopy, stomata number, stomatal index, vein islet number and vein termination number were determined by using fresh leaves of the plant (Kokate, 1997).

RESULTS AND DISCUSSION

The present paper deals with the study of T.S. of stem, T.S. of leaf, study of stomata, phytochemical constituents and Powder analysis.

T. S. OF STEM

The transverse section of the stem was wavy in out line. The epidermis was outermost layer of stem made up of compactly arranged barrel shaped cells. The outer cell wall was greatly thickened and heavily cutinized. Beneath the epidermis, multilayered thick walled hypodermis was present. Beneath hypodermis multilayered parenchymatous cortex was present. The cortex with large intercellular spaces. Endodermis and pericycle was not distinct. Inner to cortex a ring of many conjoint, collateral and open vascular bundles were present. Phloem was present toward epidermis. Xylem was endarch and radially arranged medullary rays are present in between vascular bundles. Multilayered polygonal compactly arranged cells were present at the center forming pith (fig. 1).

T. S. OF LEAF

It was typical dicot leaf. The leaf was covered on both surfaces by a single layered epidermis. The epidermis was single layered and made up of compactly arranged barrel shaped parenchymatous cells. The outer surface of the epidermis was covered with cuticle. Stomata were found in both upper and lower epidermis. The mesophyll tissue was differentiated into palisade tissue towards upper epidermis and it contain double layered columnar cell compactly arranged with chloroplast. Spongy tissue towards lower epidermis, cells were polygonal loosely arranged with numerous intercellular spaces. Each vascular bundle was conjoint, collateral and closed. Xylem present towards upper epidermis and phloem toward lower epidermis. The vascular bundle was enclosed by a parenchymatous bundle sheath.

STOMATA

The leaf was simple smooth, leaf lamina has entire margin with unicostate reticulate pattern of venation. The leaf was amphistomatic. The stomaties of both the surfaces were paracytic, the guard cells were surrounded by two subsidiaries, which are morphologically corelated with epidermal cells. The subsidiary cells are parallel to the long axis of the pore and guard cell. Stomata were found in most abundance in the lower epidermis while they are very few in the upper epidermis (Fig 2 and 3).

TRICHOME

The trichomes were present on both the adaxial and abaxial leaf surfaces. The trichomes of upper surface are unicellular with cytoplasmic content. The foot was embedded into epidermal cell and tip of the trichome is pointed. The trichomes of lower surface were unicellular with cytoplasmic content. Foot was embedded into the epidermal cell. The length of trichome of upper surface was more than the lower surface (fig. 5 and 6).

VESSELS

The vessel elements of the secondary xylem shows variation where, 33% of the vessels were with pitted thickening. Both the end wall plates are oblique and multiperforate having size of 70 mμ diameter and 270 mμ length (fig. 4).

Flowers and Leaves

Root

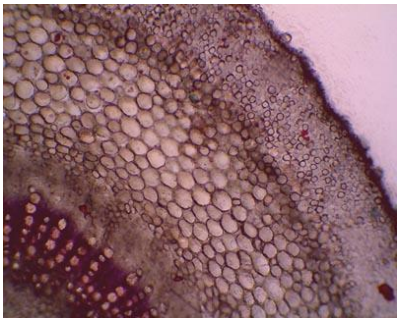

Fig. 1 : T. S. of Stem

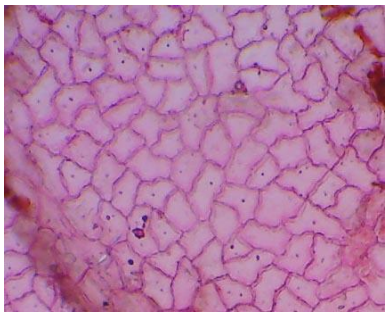

Fig 2: Stomata upper epidermis

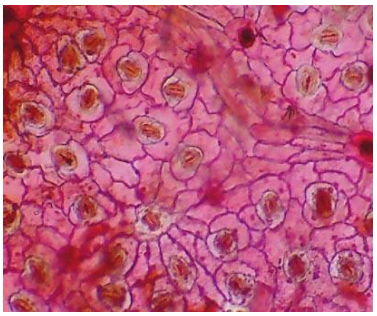

Fig 3 : Stomata Lower epidermis

Fig. 4 : Stem Vessel

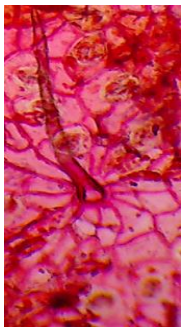

Fig- 5 : Trichomes-upper epidermis

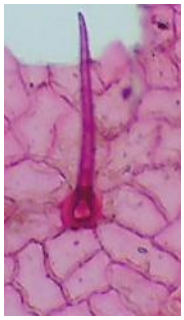

Fig 6: Trichomes-lower epidermis

Fig. 1 Different plant parts of *Adhatoda vasica*

In 33% vessels one end wall plate was transverse with simple perforation plates and other end wall was oblique with simple perforation plate. Lateral wall thickenings were reticulate, the length is 240 mμ and diameter is 40 mμ (fig. 5). In 33% of the vessels the lateral wall thickening was sclariform, one end wall was transverse with simple perforation plate and other end wall is oblique with short tail, length was 280 mμ and diameter was 100 mμ (fig. 6).

Phytochemical constituents

The preliminary phytochemical analysis of leaves powder show the presence of alkaloids, reducing sugars, anthraquinones, saponins, flavanods and tannins. The Glycoside, phlobatannins Terpenoids and Cardiacglycosides are absent (Table. 1).

Powder analysis

The powder was characterized by its morphological features like green colour; presence of specific odour and astringent taste. Microscopic study of powder reveals the presence of Lignified cells of vascular bundle, cells of epidermis are mucilaginous while endodermis contain starch. (Table. 2&3)

Table. 1–Preliminary phytochemical screening of leaves powder of *Adhatoda vasica*

Sr.no	Phytochemicals	Test	sr. no	Phytochemicals	Test
1	Alkaloid	+	6	Phlobatannins	-
2	Glycoside	-	7	Saponins	+
3	Flavonoids	+	8	Terpenoids	-
4	Tannins	+	9	Anthraquinones	+
5	Reducing sugar	+	10	Cardiacglycosides	-

Table: 2- Preliminary test of *Adhatoda vasica*.

Sr No	Test	Observation	Inference
1	Colour	Green	Leaf drug
2	Odour	Specific	Aromatic crude drug
3	Taste	Astringent	Drug contain tannins

Table 3: Flurosence analysis of the powdered leaves *of Adhatoda vasica*.

Sr No.	Reagent	Observation	Characteristic
1	Powder +Phloroglucinol+conc. HCl	Red or pink colour	Lignified cells of vascular bundle
2	Powder +Ruthenium red	Pink colour	Mucilagenous cell of epidermis
3	Powder +Sudan red III	Pink colour	Cuticle
4	Powder +Acetic acid	Insoluble	Calcium oxalate crystal
5	Powder +Conc.Sulphuric acid.	Green colour	Stone cell presnet
6	Powder +Dil. Iodine sloution	Blue	Starch in endodermis
7	Powder +Dil. Iodine solution +Conc. Sulphuric acid	Black colour	Hemicellulose absent

The standardization of crude drugs has become very important for identification and authentication of a drug. But due to certain problems the importance was not up to the mark. Thus, the lack of standardization techniques fails to identify the drug from its originality which thereby exploits the usage of drug from its traditional system of medicine (Charkaborthy and Ghorpade, 2009). The medicinal plants which are abundantly found and their authentication and identification could not be a part of standardization but it is thoroughly accepted as per traditional method of as said.

The plant *Adhatoda vasica* Nees is abundantly found and is used to treat many diseases and gives a helping hand to the humans. Thus special technique is designed for its authentication and identification on the basis of microscopy and chemical analysis. The plant produce various natural active product such as Alkaloid, Glycoside, Flavonoids, Tannins, Reducingsugar, Phlobatannins, Saponins, Terpenoids, Anthraquinones, Cardiacglycosides etc. have received considerable attention in recent years due to their diverse pharmacological properties including antimicrobial haepatoprotecive and antioxidant activities (Arokiyaraj *et al.,* 2012). The phytochemical analysis of the plant show presence of alkaloids, reducing sugar, anthraquinones, saponins, flavanods and tannins. Due to presence of these phytochemicals in this plant is used against various diseases. As the global scenario is now changing towards the use of harmless plant products, development of good quality and modern drugs from *Adhatoda* should be emphasized. Clinical trials should be conducted to support its therapeutic use.

REFERENCES

Arokiryaraj S, Sripriya N, Bhagya R, Prameela L and Udayaprakash NK, 2012. Phytochemical screening, antibacterial and free radical scavenging effects of Artemisia nilagirica, Mimosa pudica and Clerodendrum siphonanthus- An in- vitro study. *Asian Pacific Journal of Tropical Biomedicine*, pp,s601-s604.

Mahbubur Rahman AHM, Kabir RZMF, Rafiul Islam AKM and Zaman ATMN, 2013. Medico-Botanical Investigation by the Tribal People of Naogaon District, Bangladesh. *Journal of Medicinal Plants Studies*, **1**(4):136-147.

Chetty Mahdhava K, Sivaji K and Tulsi Rao K, 2008. *Flowering plants of Chittor District, Andrapradesh",* India, Students offset Printers, Tirupati.

Charkarborthy Guno Sindhu and Ghorpade Prashant M, 2009. Pharmacognostical and Phytochemical Evaluation of Stem of Abutilon indicum (Linn*)," International Journal of Pharmaceutical and Clinical Research,* **1**(3):188-190.

Daniel M, 1991. *Methods in plant biochemistry and economic botany.* Kalyani publication New Delhi.

Dinesh Mishra and Arti Broker, 2009. An Ethnomedicinal Study Among the Gond and Chhattisgarh: India. *Antrocom*, **5(**1): 61-65.

Harborne JB, 1984. *Phytochemical Methods. A guide to modern techniques of plant analysis*, 2nd Edition, Chapman and Hall, London.

Haslam E, 1996. Natural polyphenols (Vegetable tannins) as drugs: possible modes of action, *J. Nat. Prod* **59**:205-15.

Johanson DA, 1940. *Plant microtechnique*, McGraw Hill New York.

Kaushik P, Kaushik D, Khokra S and Chaudhary B, 2009. Abutilon indicum(Atibala): Ethno-Botany, Phytochemistry and Pharmacology. *A Review, International Journal of Pharmaceutical and Clinical research,* **1**(1):4-9.

Kokate CK, 1997. *Practicla Pharmacognosy*, 4th Edn, Vallabh Prakashan, Delhi, 107-111.

Naik V N, 1998. *Marathwadyteel Samanya Vanaushadhi*, Amrut Prakashan, Aurangabad.

Naik VN, 1979. *Flora of Osmanabad*, Venus publishers, Aurangabad.

Naik VN, and Associates, 1998. *Flora of Marathwada*, Amrut Prakashan, Aurganagabad.

Prasant Kumar Singh, Vinod Kumar, Tiwari RK, Alok Sharma, Rao ChV and Singh RH, 2010. Medico-Ethnobotany of Chatara Block of District Sonebhadra, Uttar Pradesh, India, *Advances in Biological Research*,**4**(1):65-80.

Venkataswamy R, Mohamad Mubarack H, Doss A, Ravi TK and Sukumar M, 2010. Ehtnobotanical Study of Medicinal Plants Used by Malasar Tribals in Coimbatore District of Tamil Nadu (South India). *Asian Journal. Exp. Biol. Sci,* **1**(2):387-392.

Taydae SK and Patil DA, 2005. Ethnomedicijnal Traditions of Tribals of Nandurbar District(Maharashtra), *Journal of Phytol. Res.* **18**(2):251-254.

Mahajan SK, 2007. Traditional herbal remedies among the tribes of Bijagarh of West Nimar District, Madhya Pradesh. *Indian Journal of Traditional Knowledge,* **6**(2):375-377.

Ramya S and Jayakumararaj R, 2009. Antifeedant Activity of Selected Ethno-botanicals used by Tribals of Vattal Hills on Helicoverpa armigera (Hubner). *Journal of Pharmacy Research*, **2**(8): 1414-1418.

Dey SK, De A, Karmarkar S, DE PK, Charkarborty S, Samanta A and Mukherjee A, 2009. Ethnobotanical Study in A Remote District of West Bengal, India. Pharmbit **XX** (2):91-96.

Sampath Kumar KP, Debjit Bhowmik, Chiranjib, Pankaj Tiwari and Rakesh Kharel, 2010. Indian traditional herbs Adahtoda vasica and its Medicinal application, *Journal of Chemical and Pharmaceutical Research*, **2**(1): 240-245.

Yadav SR and Sirdasai MM, 2002 *Flora of Kolhapur District.* Shivaji University Kolhapur, Maharashtra, India.

How to Cite this Article:

Kanthale P R and V H Panchal, 2015. Pharmacognostic Study of *Adhatoda vasica* Nees. *Bioscience Discovery,* **6**(1):49-53.